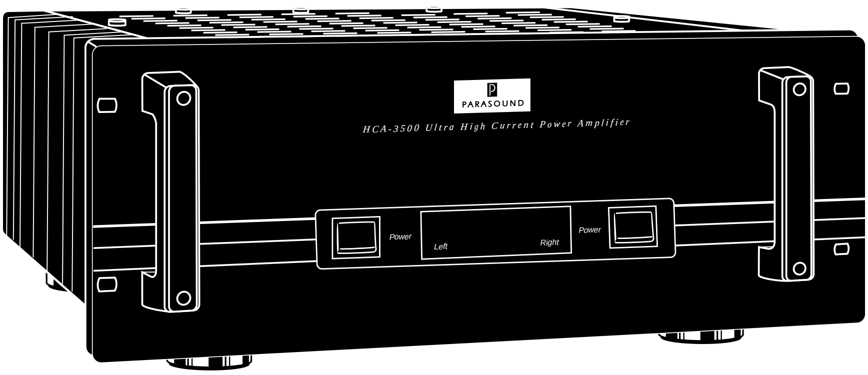
O W N E R ' S M A N U A L

PARASOUND

HCA-3500 Ultra High Current Power Amplifier



Designed in California by John Curl

Table of Contents

Special Features for the Parasound HCA-3500

Independent power supplies for each channel for true dual-monaural operation
Massive encapsulated 1.4 kVA toroid power transformer for each channel
97,600 uF power supply capacitance for each channel
Multiple polystyrene film bypass capacitors in power supply
Direct coupled design uses no inductors or capacitors in the signal path
DC servo direct-coupled audio circuits with 0.5 Hz rolloff
Output transistors direct-coupled to speakers without LRC networks
Cascode Class A input stages with matched J-FET pairs
Hand-picked complementary MOSFET transistors in high voltage driver stage
High-bias Class A/AB operation provides 15 Watts of pure Class A operation
8 complementary pairs of 15 ampere 60 MHz output transistors per channel
High-quality Neutrik XLR jacks for balanced inputs
Two sets of gold-plated metal structure RCA input jacks for balanced operation
Two sets of gold-plated 5-way binding posts facilitates bi-wiring
Multiple protection circuits, temperature sensors and silver-cadmium relay protection
Glass epoxy circuit boards, double-sided for precision
Two hand-made audiophile-grade AC power cords-separate for each channel

IMPORTANT SAFETY INSTRUCTIONS

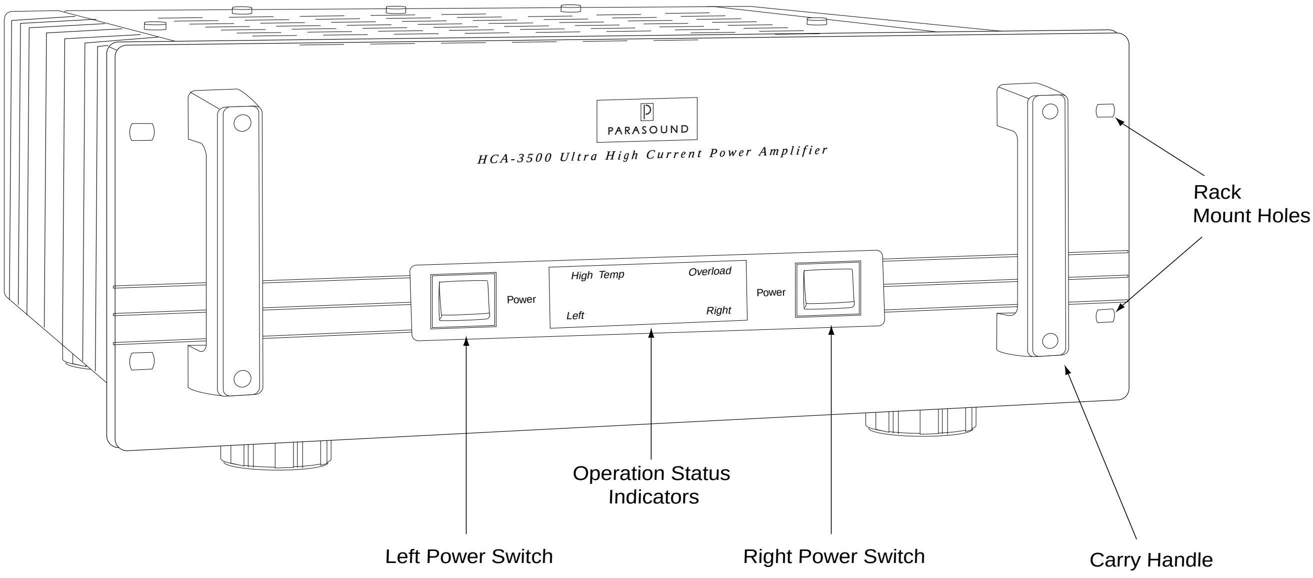
The lightning flash with the arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of “dangerous voltage” inside the product that may constitute a risk of electric shock.

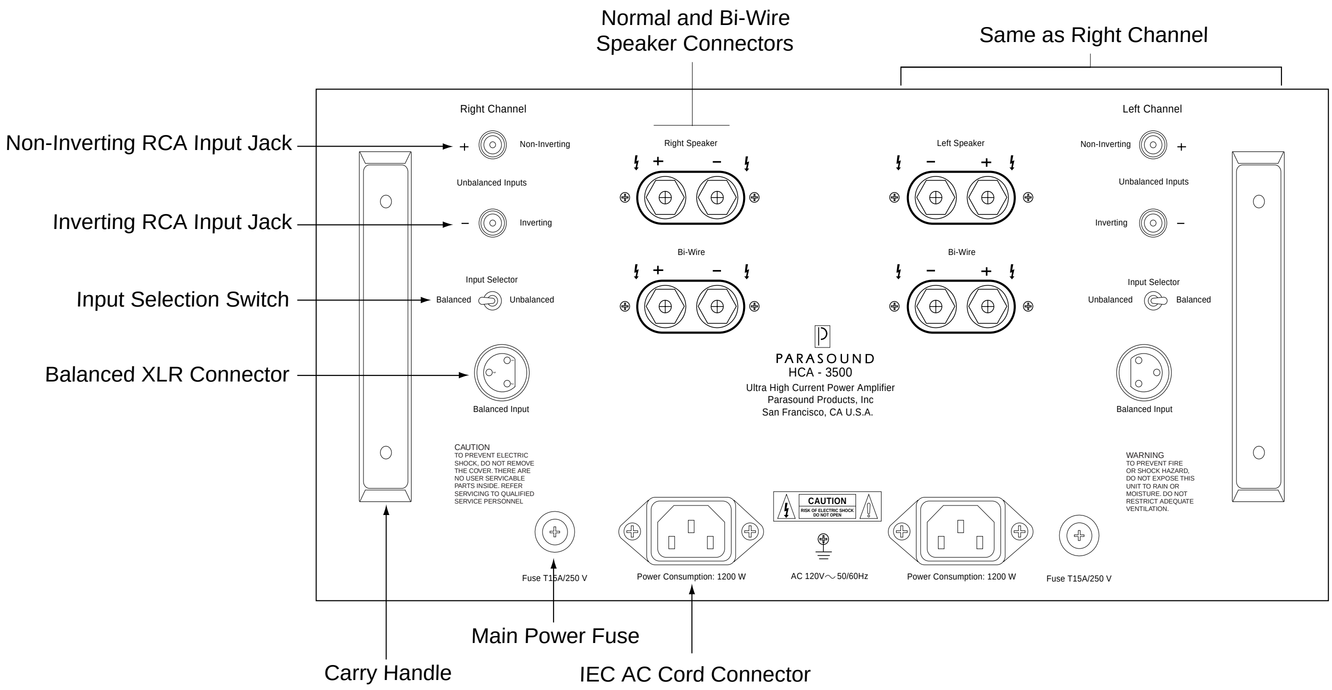
The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance instructions in the literature accompanying the product.

TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER. NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL

1. **Read Instructions** — Read all the safety and operating instructions before operating this product.
2. **Retain Instructions** — Retain safety and operating instructions for future reference.
3. **Heed Warnings** — Adhere to all warnings on the product and in the operating instructions.
4. **Follow Instructions** — Follow all operating and use instructions.
5. **Cleaning —** Unplug this product from the wall outlet before cleaning. Use a damp cloth for cleaning. Clean the outside of the product only.
6. **Attachments —** Do not use attachments that are not recommended by the product manufacturer; they may be hazardous.
7. **Water and Moisture** — Do not use this product near water.
8. **Accessories —** Do not place this product on an unstable cart or stand. The product may fall causing bodily injury and damage to the product. A product and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the product and cart to overturn.
9. **Ventilation** — Slots and openings in the cabinet are provided for ventilation to ensure reliable operation of the product and to protect it from overheating. These openings must not be blocked or covered. *This product should not be placed in a built-in installation such as a bookcase or rack unless proper ventilation is provided.*
10. **Power Sources —** Operate this product only from the type of power source indicated on the label. If you are not sure of the type of power supply to your home, consult your dealer or local power company. This product is equipped with a three-prong grounding plug. This plug will only fit into a grounding power outlet. If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the grounding plug.
11. **Power Cord Protection —** Power supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them.
12. **Lightning—** Unplug the unit from the wall outlet for added protection during a lightning storm and when it is left unattended and unused for long periods of time. This will prevent damage to the product due to lightning and power line surges.
13. **Overloading** — Do not overload wall outlets or extension cords. This can result in a fire or electric shock.
14. **Inserting Objects into Unit** - Never push objects of any kind into this product through any openings; they may touch dangerous voltage points or short out parts that could result in fire or electric shock.
15. **Servicing —** Do not attempt to repair or service this product yourself. Opening or removing covers may expose you to dangerous voltage and other hazards. Refer all servicing to qualified service personnel.
16. **Damage Requiring Service** — Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions: a) If the power-supply cord or plug is damaged. b) If liquid has been spilled into the product. c) If the product has been exposed to rain or water. d) If the product does not operate normally by following the operating instructions. e) If the product has been dropped or damaged in any way. f) If the product exhibits a distinct change in performance.
17. **Replacement Parts** — When replacement parts are required, be sure the service technician has used replacement parts specified by the manufacturer. Unauthorized substitutions may result in fire, electric shock, and other hazards.
19. **Safety Check —** Upon completion of any service or repairs to this product, ask the service technician to perform safety checks to determine that the product is in proper operating condition.
20. **Wall or Ceiling Mounting** — Mount the product to a wall or ceiling only as recommended.
21. **Heat —** The product should be situated away from heat sources such as radiators, heat registers, stoves, and other products (including amplifiers) that produce heat.

Figure #1 HCA-3500 Front and Rear Panel Drawings





Introduction

Congratulations on your purchase of this precision audio component and thank you for your selection of Parasound. Your Parasound HCA-3500 was designed by renowned circuit designer John Curl and is built using only the finest precision components available for optimum musical quality and performance.

Each channel of the amplifier has its own power supply including an independent 1.4 kVA toroidal power transformer and 97,600 uF of filter capacitance. This dual-mono configuration provides the high levels of power needed for some of today's more sophisticated speaker systems. The inherently low output impedance of the HCA-3500 easily maintains control of your loudspeakers even during demanding impedance variations.

Unique circuit topology of the direct coupled HCA-3500 includes balanced JFET input transistors, MOSFET drivers and ultra high current output devices. The output delivers a generous 15 watts of pure class A operation. Additionally, there are no inductors or capacitors in the signal path. These design refinements reduce high odd-order harmonic distortion, improve overall clarity and preserve low-level musical details.

Please take a few moments to read these instructions so that you may fully understand the capabilities of your new Parasound power amplifier.

Unpacking Your HCA-3500

Carefully unpack your amplifier and remove all the enclosed accessories. These accessories include two 12 AWG AC cords, rack mount hole plugs, and this manual. Be sure to inspect the unit for any possible shipping damage. If you see any, contact your Parasound Dealer immediately. Save all the packing material in case you need to ship the amplifier for repair. Before you proceed, find the serial number located on the rear panel of your amplifier and record it here for reference:

Serial #____________________ Date of Purchase____________________

Installing Your HCA-3500

Locate your amplifier away from heat sources such as air ducts and radiators. Always mount the amplifier horizontally and make sure that your cabinet or shelf can support its weight. It is best to provide a separate shelf for your amplifier rather that stacking it directly above or below your other components.

The HCA-3500 occupies four rack spaces (7") in a standard 19 inch equipment rack. When rack mounting the HCA-3500, have someone help support the unit while you bolt the component to the rack rails. Be sure to use heavy duty mounting bolts and nylon shoulder washers on both sides of the faceplate to avoid scratching the amplifier's front panel and also to help prevent ground loops. Contact Middle Atlantic Products at (201) 839-1011 to obtain any additional rack mounting hardware you may need.

Ventilation Requirements

To insure safe and reliable operation, it is very important that the amplifier has *plenty of ventilation* to prevent overheating and automatic shut down from its thermal protection circuitry. Please observe the following ventilation guidelines when installing your amplifier in a cabinet or other enclosed area:

1) If you are not using a fan, allow *at least* six inches on each side and above the amplifier, and *do not* close off the front with a cabinet door or panel.
2) If you are enclosing the amplifier within an equipment cabinet, use a fan to draw in cool air and exhaust warm air. Two vent holes are required: one for intake and one for exhaust.
3) Do not place the amplifier on carpeting that will obstruct the air flow into the bottom of the amplifier chassis and heatsinks.
4) Avoid stacking components. If you do stack components, you *must* use a fan to circulate the warm air that will quickly become trapped between them when they are powered on.

Making Connections to the HCA-3500

Refer to Figure #1

Leave the AC cords disconnected before making any signal or speaker connections. When making connections to the amplifier, make sure there is no strain or tension on the input leads, speaker wires, or AC cord that could cause them to pull loose.

RCA Jack Input Connections

You can connect the output of your preamplifier or processor to the RCA input jacks in a variety of ways:

Normal Unbalanced Non-Inverting Input

Connect the unbalanced outputs of your preamplifier to the left and right positive (+) inputs only. With this connection, the HCA-3500's output is non-inverted; a positive signal at the input results in a positive signal at the output.

Unbalanced Inverting Input

Connect the unbalanced output of your preamplifier to the to the left and right negative (—) inputs only. With this connection, the HCA-3500's output is inverted; a positive signal at the input results in a negative signal at the output.

Balanced RCA Inputs

Connect the left and right positive (+) output of your preamplifier to the left and right positive (+) inputs of the HCA-3500 and connect the left and right negative (—) output of your preamplifier to the left and right negative (—) inputs of the HCA-3500. These balanced connections provide an alternative to using an XLR connector if your preamplifier is equipped with (+) and (—) RCA output connectors.

XLR Input Connections

If your preamplifier is equipped with balanced XLR output connectors, you can use these connections as an alternative to the RCA jacks. The industry standard pin assignment for the HCA-3500's XLR input connector is Pin 1: Ground, Pin 2: Positive (+), and Pin 3: Negative (—).

Input Selector Switch

Once you have decided which input connectors you will use, set the input selector switches to their Unbalanced or Balanced XLR position.

Speaker Connections

You may connect bare wire up to AWG 12, speaker wire terminated with 1/4" spade lugs, or banana plugs to the five-way binding posts of your power amplifier. If you use bare wire without terminals, make sure you remove only enough insulation so the wire can fit through the hole that runs sideways through the terminal's binding post. Before inserting the wire, twist all its strands tightly to prevent strays that could cause a short circuit. (You may want to "tin" the stripped wire with solder to prevent it from fraying and oxidizing.)

Bi-Wiring

The HCA-3500 is equipped with an additional set of binding posts to facilitate bi-wiring. These extra speaker connectors are in parallel with the main binding posts. If your loudspeakers have two sets of speaker connectors, you can bi-wire by connecting two sets of speaker cables from each channel of your HCA-3500 to your speakers. Bi-wiring effectively reduces the lead resistance of your speaker wire thus diminishing power loss and improving damping factor. The extra set of binding posts also make it easy to connect an additional pair of speakers.

Observing Correct Polarity

When you connect speakers to your amplifier, you will notice that one side of the two conductor speaker wire will have some sort of mark: either printing, a raised ridge on the insulation, or a different color of conductor to let you know which wire to connect to the positive and which to the negative speaker terminals so you can repeat the connection on the power amplifier's binding posts.

Minimum Speaker Impedance Precautions

Although the HCA-3500 is capable of driving speakers with occasional impedance dips well below 2 Ω, it is primarily designed to drive loudspeakers with a 4 Ω or 8 Ω nominal impedance. This is because sustained high power operation into loads of less than 4 Ω may cause overheating and subsequent thermal shutdown.

AC Power Connections and AC Grounding

Before you connect the AC cords, make sure the HCA-3500's power switches are in the off or down position. If possible, plug your amplifier directly to an AC wall outlet. Be sure to plug both AC cords into the same outlet help prevent possible ground loops. Do not connect the AC cords to the accessory AC outlet on your preamplifier because the amplifier's current draw exceeds the ratings of most preamplifier's power switches and power cords. If you use an external AC line conditioner or surge suppressor, make sure it can withstand the HCA-3500's power requirements listed in the specification section of this manual.

Operating the HCA-3500

Refer to Figure #1

Power Switches

There are separate power switches for the left and right channels. Press the upper side to turn each channel on; press the lower side to turn each channel off.

Bi-Color Channel Status Indicators

When you first turn the power switches of the HCA-3500 on, the Left and Right channel status indicators will light red for about five seconds while the internal circuits are stabilizing. After that, these indicators will change from red to green to signal that bothe channels are operational. Either the Left or Right channel status indicator may change from green to red if there is a fault that triggers the protection circuitry. This may indicate one of the following conditions: DC present at the amplifier's input, a speaker impedance overload, a short circuited speaker line, or a possible internal fault. If either indicator changes to red, remove power to the amplifier and check all connections. During this time, the protection circuits should automatically reset. If either Left or Right channel status indicators remain red after you reapply power, contact your Parasound Dealer, Installer, or Parasound Technical Service Department for further advice.

Current Overload Indicator

These indicators let you know if there is too low of an impedance at the amplifier's output thereby exceeding the amplifiers current capacity. During normal operation, the bi-color Left and Right channels indicators for the will be green and the Current Overload indicator will remain off. If either channel is driven beyond its maximum current capacity because the impedance for that channel is too low, the Current Overload indicator will light red and the affected channel's indicator will change from green to red.

High Temp Indicator

This indicator will light when either of the external heatsinks reaches 90 degrees centigrade. If the High Temp indicator lights, it probably means that the amplifier has inadequate ventilation. If either channel is driven beyond its thermal capacity, the High Temp indicator will light red and the affected channel's indicator will change from green to red. Refer to page 6 for more information about proper ventilation. Once the heatsink cools below 90 degrees, the amplifier channel will automatically reset and resume normal operation.

Maintaining Your Parasound Amplifier

Your Parasound power amplifier requires no periodic maintenance and has no user serviceable parts inside. To avoid the risk of electric shock, do not remove the top cover. The amplifier's exterior can easily be cleaned with a soft cloth moistened only with a few drops of water or glass cleaner.

Main Power Fuses

There is an external fuse for each channel on the rear panel. These fuses protect the unit from possible damage to internal parts. *Never replace fuses with a higher value than installed from the factory*. Substitution of larger fuses may create serious stress and damage to internal parts and *will void your warranty*.

In Case of Trouble

If you suspect a problem with your amplifier, first turn the amp off and check all your connections. The trouble may be caused by another component or even a defective hookup cable. If you are hearing hum out of your speakers, turn off the amplifier and disconnect the inputs to it. If the hum goes away, when you turn the amplifier back on it was probably be caused by your preamplifier or one of the source components connected to it. Also, make sure that both AC cords are connected to the same AC outlet. In rack mounted systems, ground loops and hum can sometimes develop via the metal rack rails of the equipment rack. This problem can be solved with nylon shoulder washers (refer to rack mounting section of this manual).

If All Else Fails...

Call your Parasound dealer or Parasound Technical Service Department. We can suggest other diagnostic tests you can easily perform. If we determine that your amplifier should be returned to Parasound or an Authorized Parasound Warranty Center for inspection and possible servicing, call Parasound for the location of a warranty center near you. If you choose to send it to Parasound, contact us to obtain a Return Authorization (RA) number. You will be asked to repack the unit in its original packaging including the additional outer box for protection during transit. The RA number must be clearly marked on the outer carton only. You should ship the unit by UPS with adequate insurance and a copy of your purchase receipt to validate your ownership.

Units that arrive without your specific RA number, without a suitable shipping carton or with evidence of improper internal packing may be refused. We do not accept collect shipments. After repair under warranty, the unit will be returned to you via prepaid UPS within the Contentinental United States. In the case of a non-warranty repair, contact us and we will advise you of the repair charges before you ship the unit to us. The same packing and Return Authorization number requirements apply.

Parasound HCA-3500 Specifications

Continuous Power Output
350 watts RMS per channel from 20 Hz-20 kHz into 8 Ω, both channels driven
500 watts RMS per channel from 20 Hz-20 kHz into 4 Ω, both channels driven

Current Capacity
120 amps peak per channel

Slew Rate
> 130 V/µS

Power Bandwidth
2 Hz-150 kHz, +0/-3 dB at 1 watt

Total Harmonic Distortion
< 0.05 % at full power; < 0.01 % typical levels

Intermodulation Distortion
< 0.03 %

Transient Intermodulation Distortion
Unmeasureable

Dynamic Headroom
> 1.5 dB

Interchannel Crosstalk
> 95 dB at 1 kHz
> 80 dB at 20 kHz

Input Impedance
100 kΩ

Input Sensitivity
1.4 V for 100 watts output
2.25 V for full output

Gain
31 dB

Signal to Noise Ratio
> 115 dB, input shorted, IHF A-weighted

Damping Factor
> 1000 at 20 Hz

Power Requirements
110 Vac-120 Vac 1200 watts per channel

Dimensions
19" wide x 7" high x 18" deep (7 3/4" high with feet)

Weight
80 lb Net

PARASOUND

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